Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(Civil Engineering) (Sem.–7)

SOIL DYNIMICES AND MACHINE FOUNDATION

Subject Code : BTCE-811

Paper ID : [A2965]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.
4. Any missing data may be assumed appropriately. Use of IS 2974 (Section A & Section B) and IS 5249 is permitted.

SECTION-A

1. Answer briefly :

a) What are the stress conditions on soil under dynamic load?

b) Differentiate between frequency and vibration.

c) What do you understand by Rayleigh's method?

d) Give principles of vibration measuring instruments.

e) Define soil spring constant and its significance.

f) Differentiate between damping and Magnification factor.

g) What are different types of machines?

h) What are problems associated with machine foundation?

i) Give IS code provisions for Impact machine foundation.

j) Write note on transmissibility.

SECTION-B

Q2. What do you understand about wave propagation in elastic half space?

Q3. Derive an expression for logarithmic decrement in terms of damping factor.

Q4. Using Barkan's approach determine the coefficient of uniform compression, if a vibration test on a block 1.5m × 0.75m × 0.7m gave a resonance frequency of 20 Hz in the vertical direction. The mass of the oscillator used was 100 kg. The mass density of the test block material is 2400 kg/m^3.

Q5. Explain the resonance and its effect.

Q6. Discuss methods of isolation for machine foundations.

SECTION-C

Q7. A cyclic plate load test was carried out on a soil deposit to estimate the elastic coefficients for the design of a compressor foundation. The test was carried out at a depth of 3m using a 0.6m × 0.60m test plate. For the data given below, plot the stress versus elastic settlement relationship and determine the coefficient of elastic uniform compression at (i) 0.6 × 0.6m plate area and (ii) 10m^3 footing area. Take Poisson's ratio = 0.35 and unit weight of soil = 18 kN/m^2.

Stress (kN/m^2)	50	100	150	200	250	300	350
Elastic settlement (mm)	0.05	0.28	0.52	0.8	1.06	1.34	1.6

Q8. Derive equation for block foundation subjected to rocking, sliding and vertical vibrations.

Q9. Design a suitable foundation block for a double acting steam hammer whose data are given below.

Weight of the falling ram = 5.0 t. height of the drop = 1.5 m.

Area of the piston = 0.2 m^2. Average steam pressure on piston = 120 t/m^2. Weight of the anvil = 100.0 t. Base area of the anvil = 6.0 m^2. Weight of the frame = 1.5 t, which is fixed to the foundation block.

The thickness of the pad under the anvil is 0.60 m. 'E' of the material of pad = 5.0 × 104 t/m^2. Coefficient of impact (restitution) = 0.65. Soil properties : coefficient of uniform compression = Cu = 4.5 × 10^3 t/m^3 . Mass density of soil = 1.9 g/cc. Safe bearing capacity of the soil is 25 t/m^2.